Illustrated Catalogue

OF

B. F. STURTEVANT'S

PRESSURE BLOWERS

AND

Exhaust Fans.

B. F. Sturtevant, Patentee & Manufacturer,

BOSTON.

Illustrated Catalogue

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Pressure Blowers

AND

Exhaust Fans.

SMITH & PORTER, PRINTERS, BOSTON.

1870.

To My Customers.

I desire to extend thanks for the confidence and patronage extended to me for the last five years, during which time I have put in operation about ***four thousand*** (4000) of my PRESSURE BLOWERS and EXHAUST FANS, which are in all cases, so far as I know, working with perfect success. If such is not the case with any of them, and the purchasers will notify me of the fact, I will give them immediate personal attention, and make them perfectly satisfactory or refund the money.

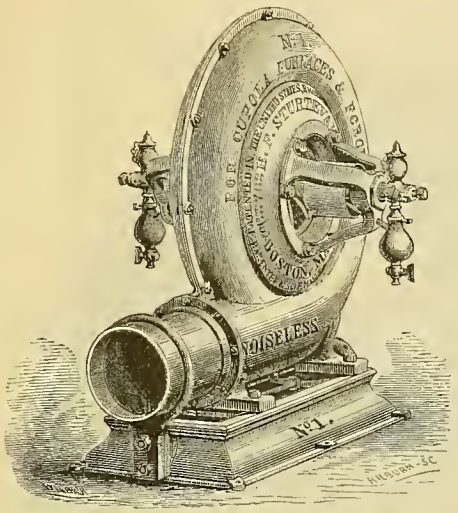
In presenting this circular, I have endeavored to give my customers and the public generally, all the figures and exact data which I have obtained, that will be of service to them in the selection and running of Blowers.

My success in the production of the PRESSURE BLOWER is such that it has taken the place of Rotary and Piston Blowers on Cupola Furnaces, where the strongest and fullest blast is required.

The recent improvements which I have made in the principle, material and mode of construction, have put them far in advance of those I have formerly made.

I guarantee all my work, and give my personal attention to the requirements of my customers.

B. F. STURTEVANT.



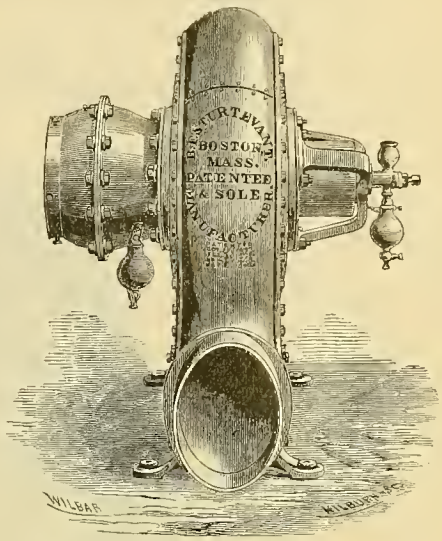
B. F. STURTEVANT'S

PATENT

Improved Pressure Blower.

Price List, July 1, 1870.

Number or size of Blower.	Price of Blower with Counter Shaft and Pulleys for two Belts.	Price of blower without counter-shaft and pulleys.	Diam. of driv'g pulleys for two belts.
0	$38 50	$35 00	18
1	49 50	45 00	21
2	71 50	65 00	24
3	99 00	90 00	28
4	143 00	130 00	32
5	198 00	180 00	36
6	264 00	240 00	42
7	341 00	310 00	48
8	429 00	390 00	54
9	528 00	480 00	60
10	638 00	580 00	66
11	770 00	700 00	72



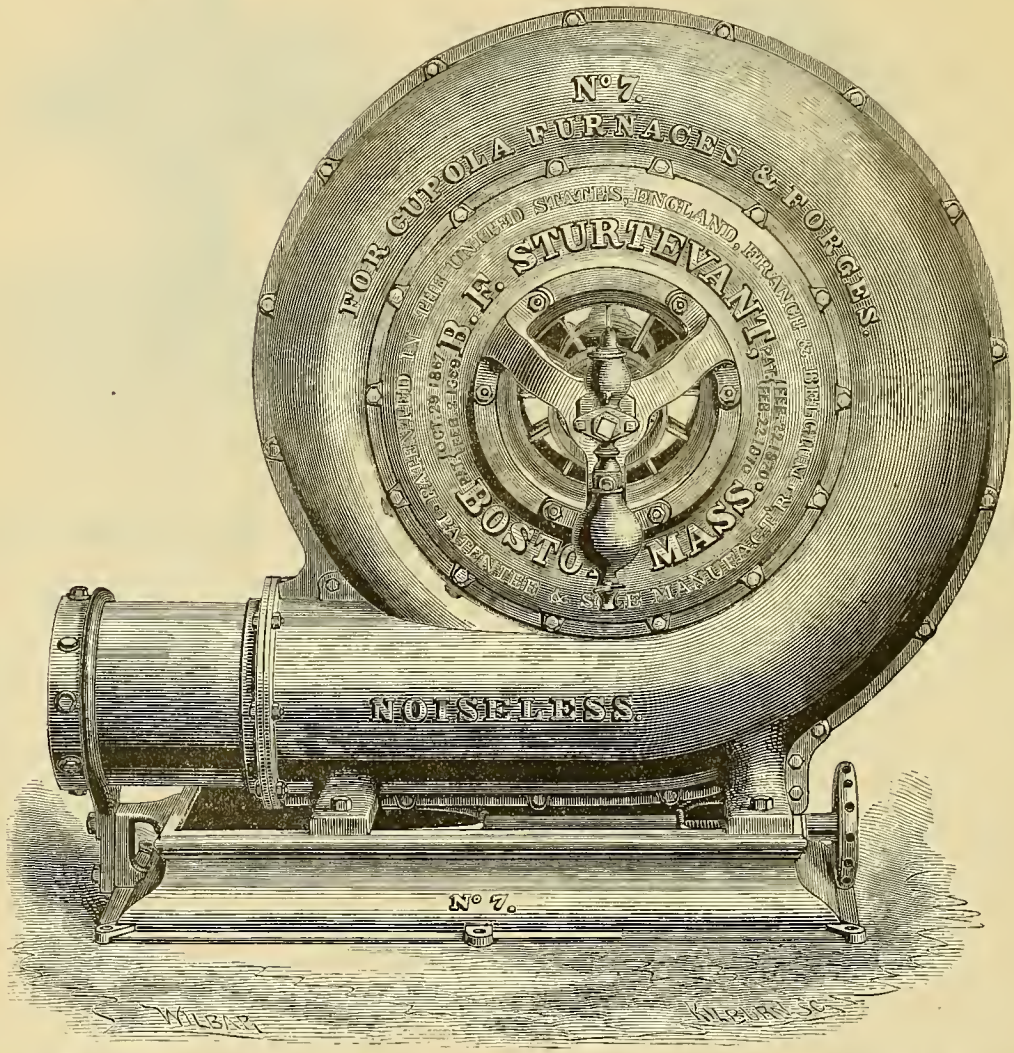
B. F. STURTEVANT'S

PATENT EXHAUST FAN.

Price List July 1, 1870.

Number or Size of Fan.	Price of Fan with Counter-shaft and Pulleys.	Price of Fan without Counter-shaft and Pulleys.	Diameter of Pulleys for driving Fan.
0	$35 00	$33 25	.....
1	45 00	42 75	.....
2	65 00	61 75	.....
3	90 00	85 50	.....
4	130 00	123 50	.....
5	180 00	171 00	.....
6	240 00	228 00	.....
7	310 00	294 50	.....
8	390 00	370 50	.....
9	480 00	456 00	.....
10	580 00	551 00	.....
11	700 00	665 00	.....

Cast Steel Pressure Blower.



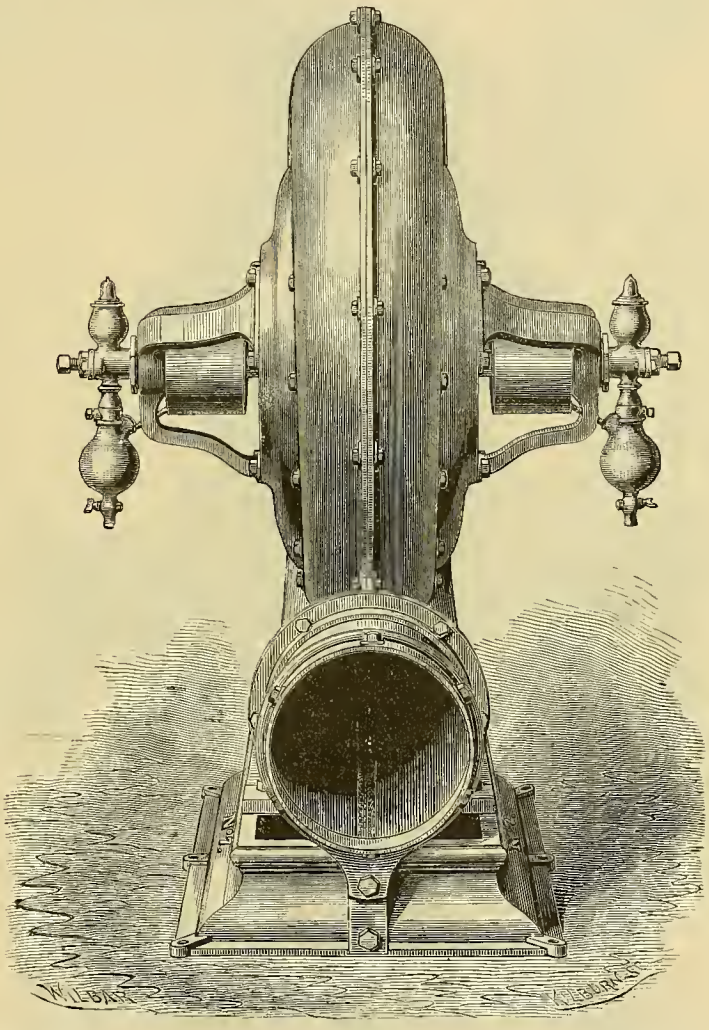
Made expressly for Iron Foundries, and will produce a stronger blast with the same amount of power, than any other blower.

The running parts of this Blower are made of cast steel. The shaft is made of tool steel and tempered. The pulleys are made of cast steel, which posesses superior durability and lightness. The blast wheel is made entirely of cast steel, by means of which it is constructed on a principle which produces the strongest blast with the smallest amount of power.

I am putting more labor and expense on the shaft pulleys and blast-wheel of this blower than I formerly put upon the whole blower, although no pains have been spared in fitting up the best tools for manufacturing them.

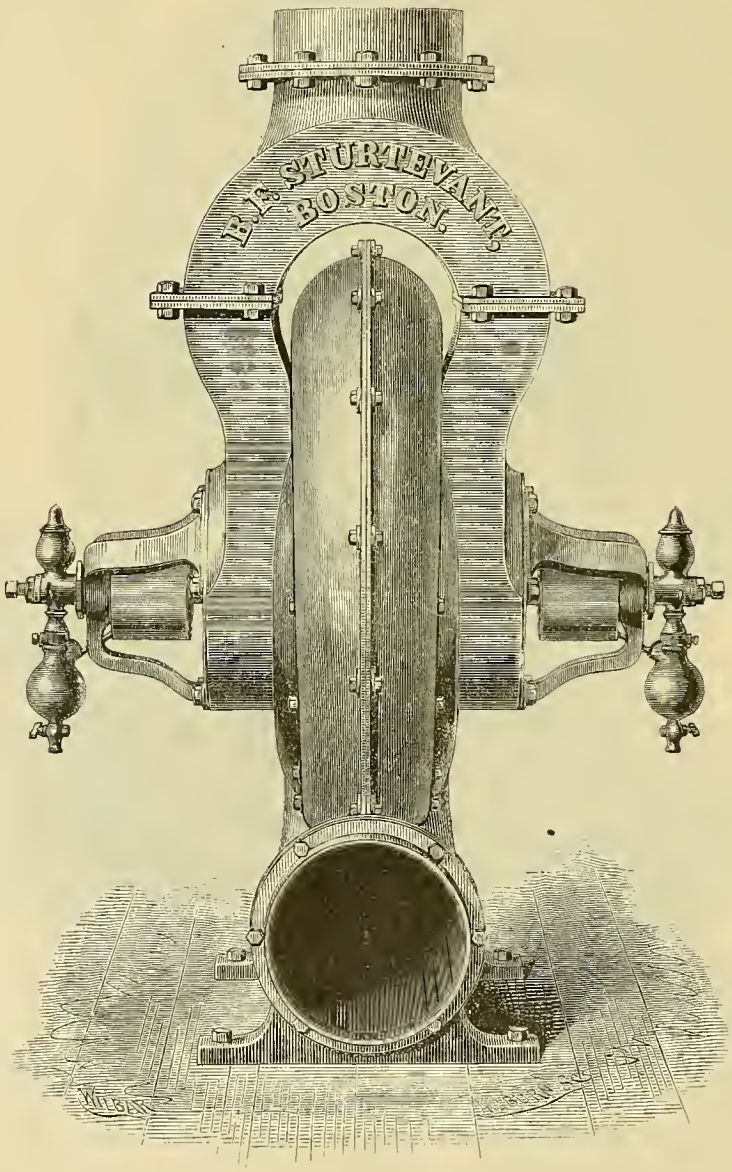
Front View of

Pressure Blower.

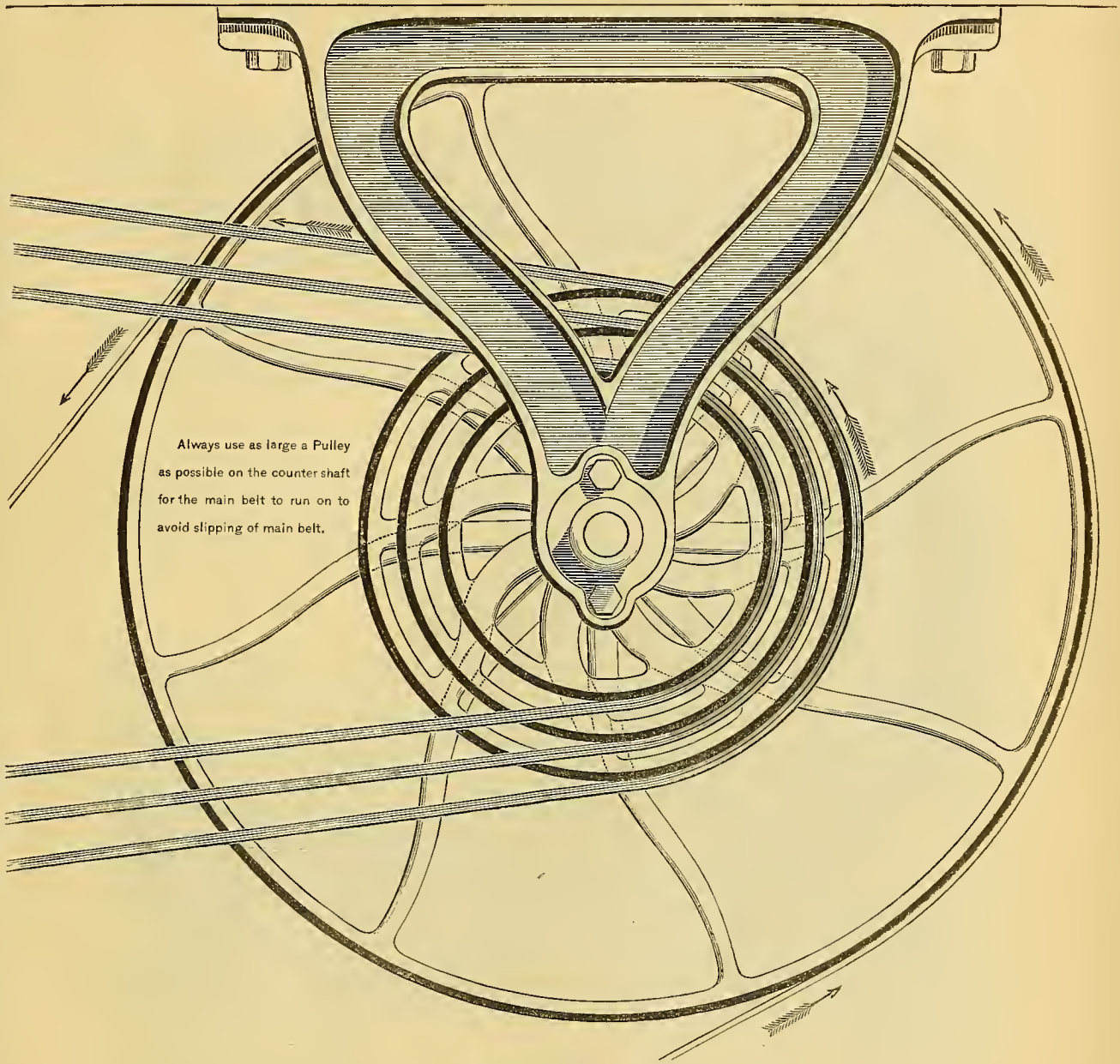


This Blower is adapted for foundries and large forge establishments, and combines the greatest possible degree of durability and economy of power, makes no noise when running at its highest rate of speed, and is manufactured regardless of expense. The materials used in the running parts of these Blowers being the best that can be had. The only parts being exposed to wear are the self-oiling Journal Bearings, (duplicates of which I send with each blower,) consequently the blower will run many years without repairs of any kind. Notwithstanding it is so exceedingly simple, the principles of its construction are thoroughly scientific and mechanical, and this is why this blower so readily supersedes all others,

B. F. Sturtevant's
Patent Gas Exhauster.



For use in Gas Works for removing the gas from the retorts to the gasometer, and in Lead Works for forcing carbonic acid gas into the corroding rooms, and also, for use in Chemical Works where any kind of gas is to be distributed.



SPEED.

The object of publishing the accompanying engravings in connection with other information on Blowers is to enable parties to avoid mistakes in their calculations for obtaining the requsite speed on Blowers.

In all cases where the purchasers of the Sturtevant Blower fail to realize all that they expected from the Blower, it has been due entirely to a deficiency of speed caused by the slipping of the belts. It is not generally known that a Blower may fall short twenty-five per cent. of the calculated speed and at the same time have all the belts keep their proper places on the pulleys.

The increase or diminution of the pressure or force of blast is greater than the increase or diminution of speed, hence the importance of using proper pulleys and belts.

The main belt should always be of double the thickness of the Blower belt, and the width governed by the diameter of the pulleys and the speed of the Blower.

Power.

In cases where the main shaft runs from 80 to 100 revolutions per minute, and will not take on a large driving pulley, parties oftentimes reduce the small pulley on the counter-shaft in their efforts to obtain the requisite speed on the Blower, so as to afford but very little surface for the main belt, at the same time they have no means of knowing how fast the Blower is running, when perhaps it is falling short from 10 to 25 per cent. of the calculated speed.

This is a very bad mistake, and one that the Inventor and Manufacturer of the Blower is not at all responsible for. A deficiency in the speed of the main shaft should always be made up by the enlargement of the driving-pulleys, so that the requisite amount of belt surface can be obtained on the small pulley on the counter-shaft.

New Belting.

New Belting, such as is generally used for the driving belts, on polished iron pulleys, will only transmit from one-third to one-fifth the power, without slipping, that the same belt will after it has been in use from one to two months. Consequently, it sometimes occurs that the Blower will not perform so well when it is first started up, as after it has run a while.

Thin Belting.

It will be readily seen that the thickness required for any belt depends entirely upon the amount of strain upon it, which is governed by the diameter of the pulley it runs over. For example, if the pulley on the Blower is six inches in diameter, and the driving pulley on the counter-shaft 42 inches, and the belt about four inches wide, the belt cannot possibly be subjected to so great a strain as it might be if the pulleys were both 42 inches, for the reason that the amount of surface on the small pulley is so much less than that on the large. A belt running from a 42 inch pulley to a 12 inch, would need to be one-third heavier, and to an 18 inch, double the thickness of that required to a 6 inch. None of these Blower belts are exposed to the wear and tear of shippers as lathe belts are; all of them run over small pulleys in proportion to the width of the belts. Hence I recommend the accompanying scale of thicknesses of belts in proportion to the widths, the lighter the belt the tighter it hugs the pulley, for the reason that all unnecessary weight of leather tends to lift itself off the pulley when going around it at a great velocity, and some of these belts travel at a velocity of five thousand feet per minute.

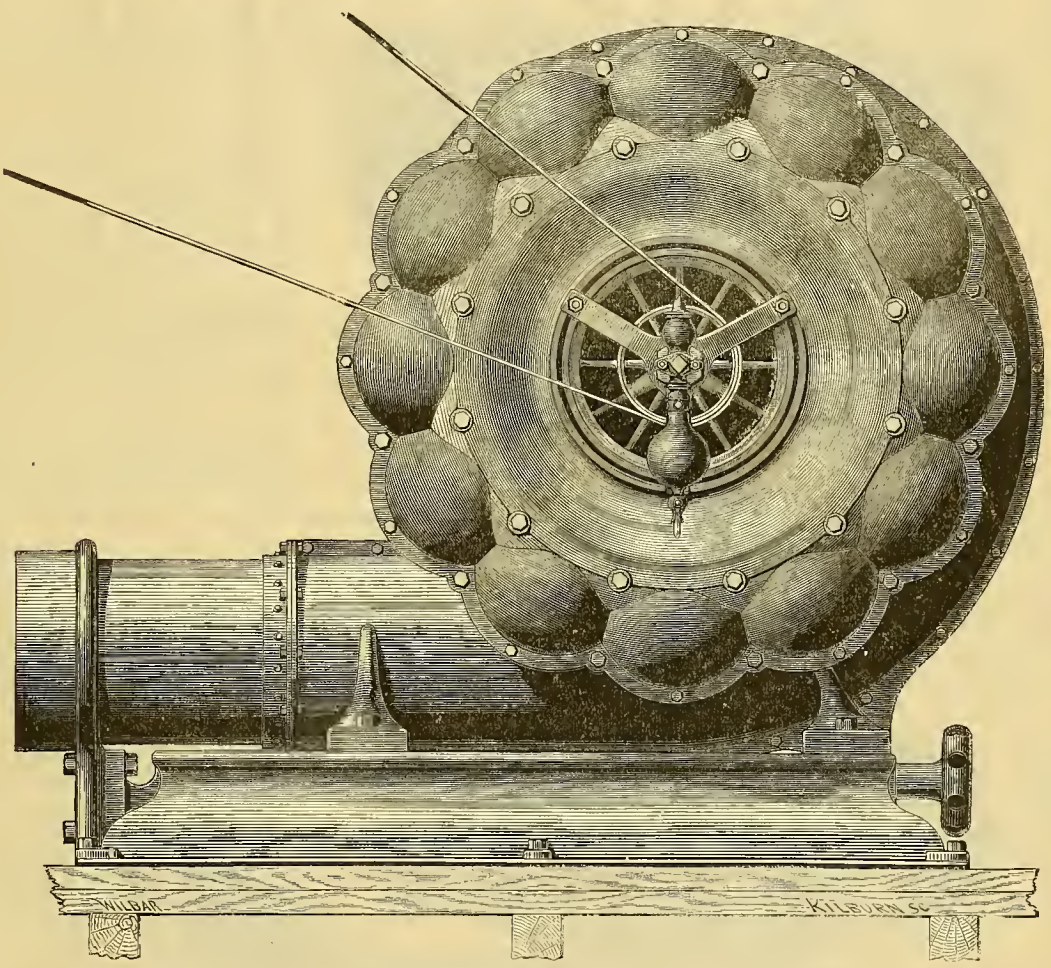
Belting, as it is generally manufactured as an article of merchandise, is intended for all purposes for which belting is used; but when parties are desirous of having every thing about the Blower just as it should be, they will see that their belts are made exactly to suit their work.

Special Belts.

Having made a series of experiments with different kinds of leather, made up into belts in different ways, I have been led to adopt a standard of quality of stock, style of making the belt, stuffing, and an adhesive coating for the surface, which is far superior to anything to be found in the usual stocks of belting, and I now have belting of this quality manufactured expressly for each size of Blower, costing about the same per foot as common belting.

B. F. Sturtevant's Patent Multiplying or

Double Blower.

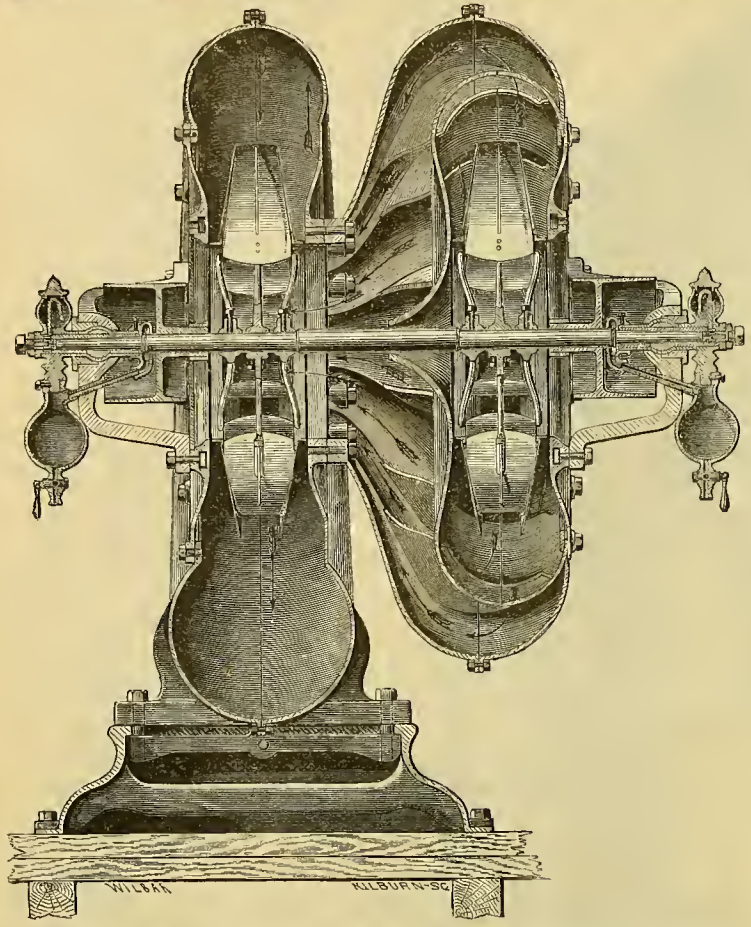


This is one of the oldest inventions in Fan Blowers, and many attempts have been made to make it work, but without success, except so far as attained in the Sturtevant Blower; (few of which are in use.) There is no advantage to be gained except in cases where parties require a pressure of 1½ lbs. or more. No well constructed cupola will work well with more than 1¼ lbs. pressure, and this can be had with less power with the single Sturtevant wheel than with two or three wheels. 1 lb. blast is good for 30 tons to a heat in one cupola. Double and triple Blowers are more complicated and costly than single wheel Blowers, far more liable to get out of order, and more difficult to repair.

Blowers of this description are made to order for special uses, where very strong blast is necessary.

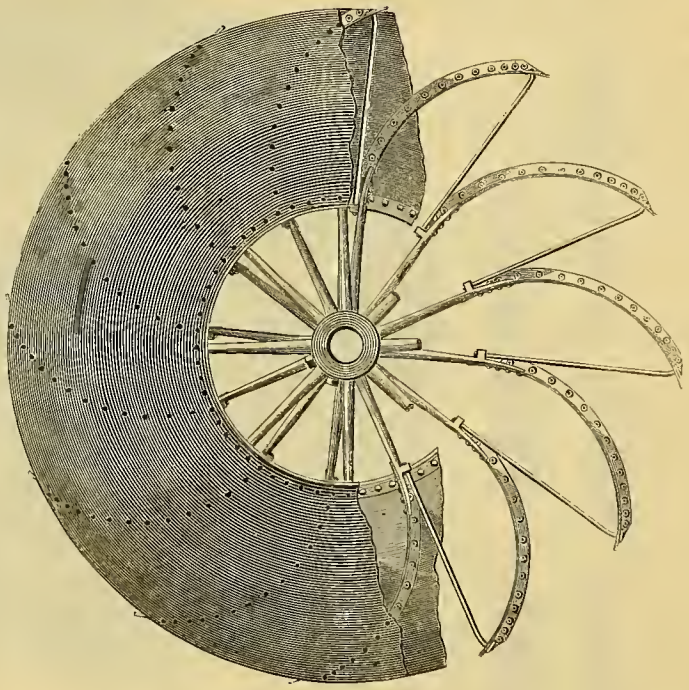
Sectional Cut of

Sturtevant's Double Pressure Blower.



t. It will be seen, by examining the engraving, that the wind after leaving the first wheel, passes out through the Multiduct Case into the next wheel, which doubles the pressure by giving it a rotary motion, the same as it received from the first wheel. This kind of Blower can be made to work, but cannot succeed for general use in foundries or forge shops.

B. F. Sturtevant's Patent Blast Wheel.



This wheel, which makes the blast in the Sturtevant Pressure Blower is made almost wholly of cast steel, which combines the minimum of weight with the maximum of strength and durability. The improvements patented in this wheel are such as to enable it to produce blast with less power than any other wheel. Every thing being right **it will utilize 85 per cent** of the power applied to it, **only wasting 15 per cent in friction.** Nothing comes in contact with this wheel; it simply revolves in the wheel-case without touching anything, and will not wear out by use.

No. 7 Diagram showing how much more wind the Sturtevant Blower makes than the Root Blower.

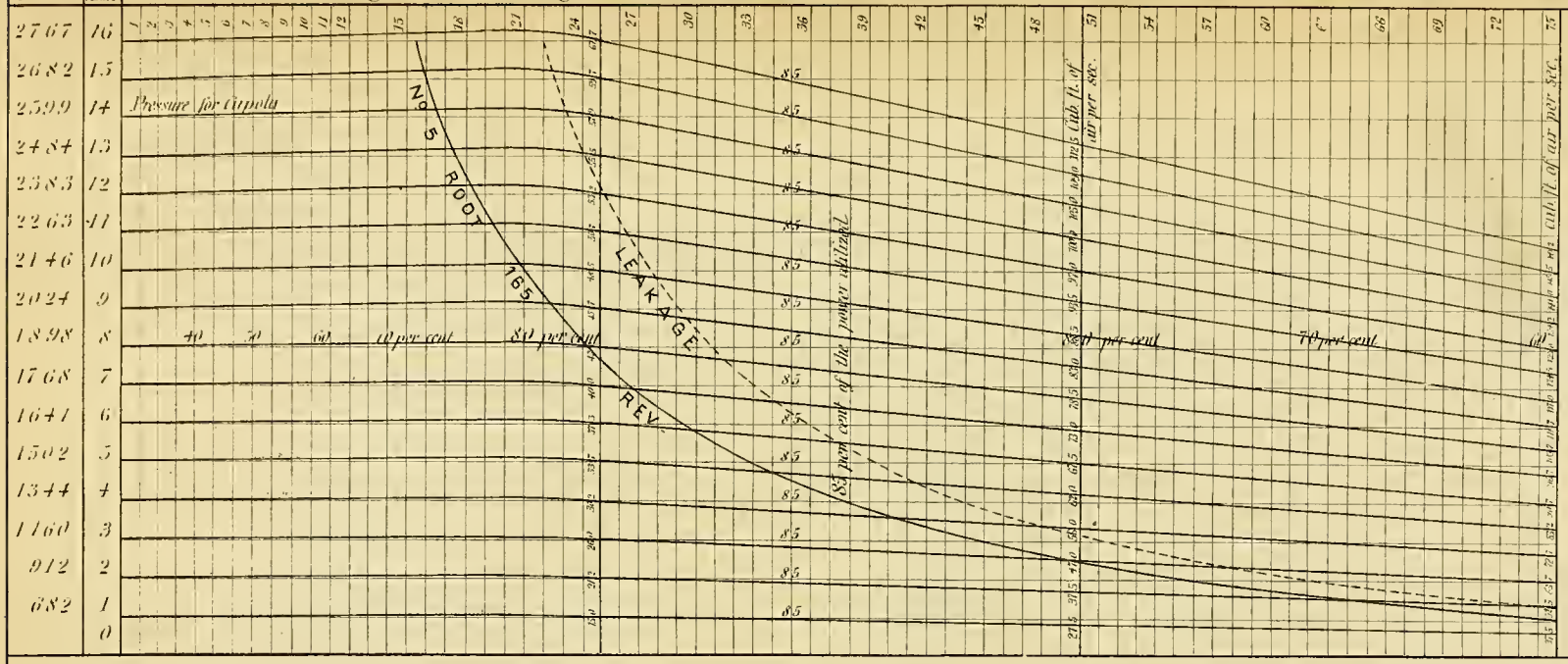
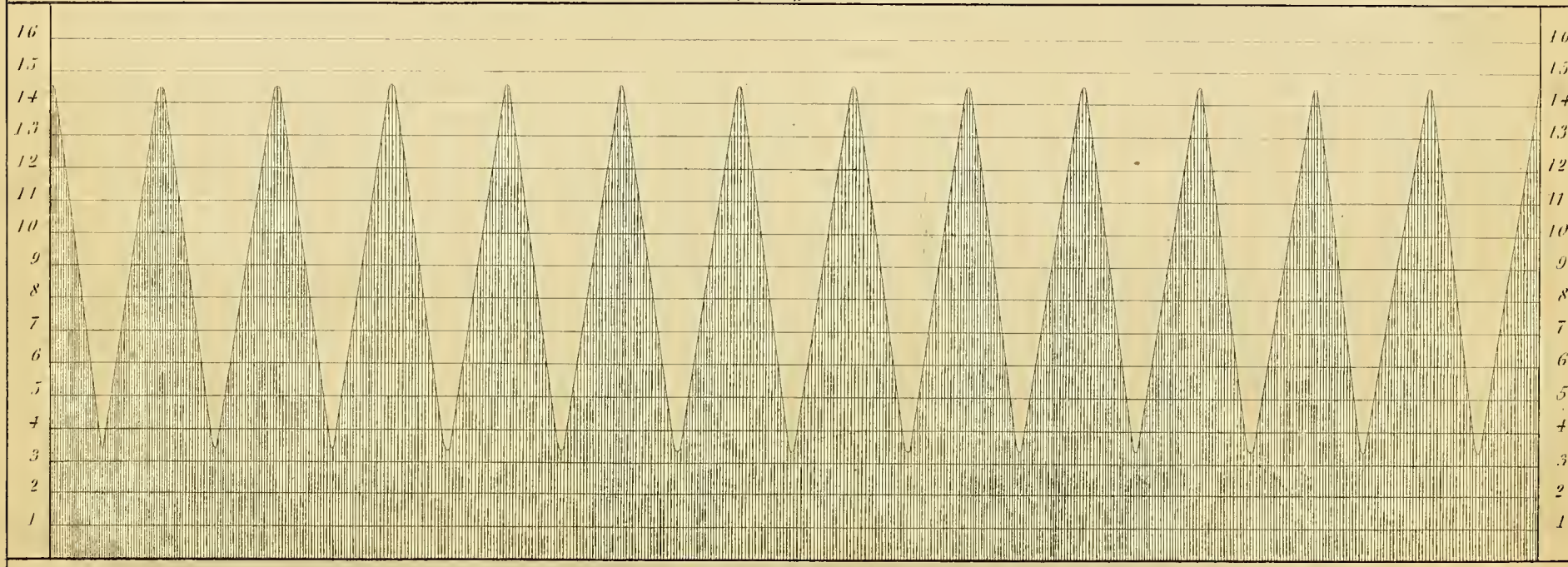


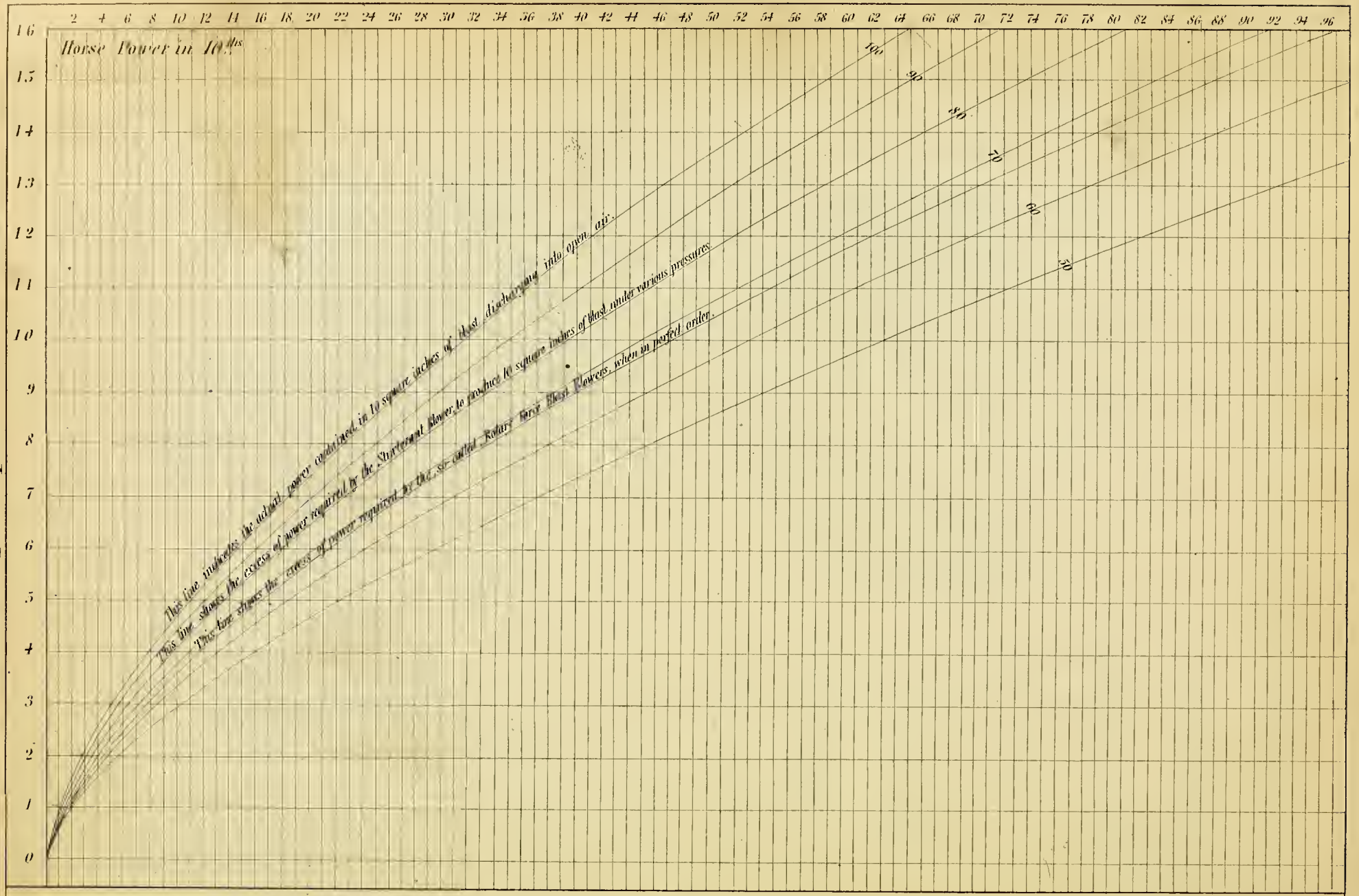
Diagram showing the Puffing or Pulsation of the so-called "Patent Rotary Force Blast Blowers" while furnishing blast for Cupola furnaces. The Sturtevant Pressure Blower does not puff, but forces the wind steadily.



This diagram represents 2 1/2 seconds of time of Mc. Kenzie's running at 100 revolutions per minute and Roots at 150.

J. Mayer & Co. lith. 4 State St. Boston.

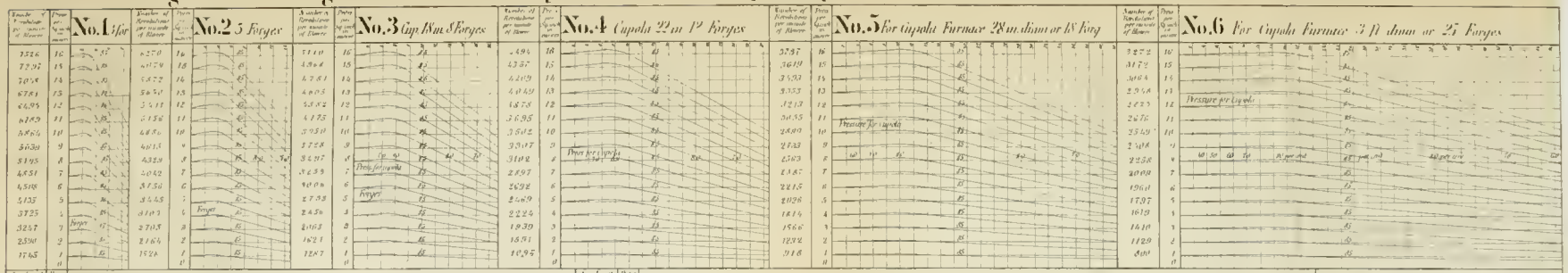
DIAGRAM SHOWING THE EXCESS OF POWER REQUIRED FOR 10 SQR. IN. OF BLAST.

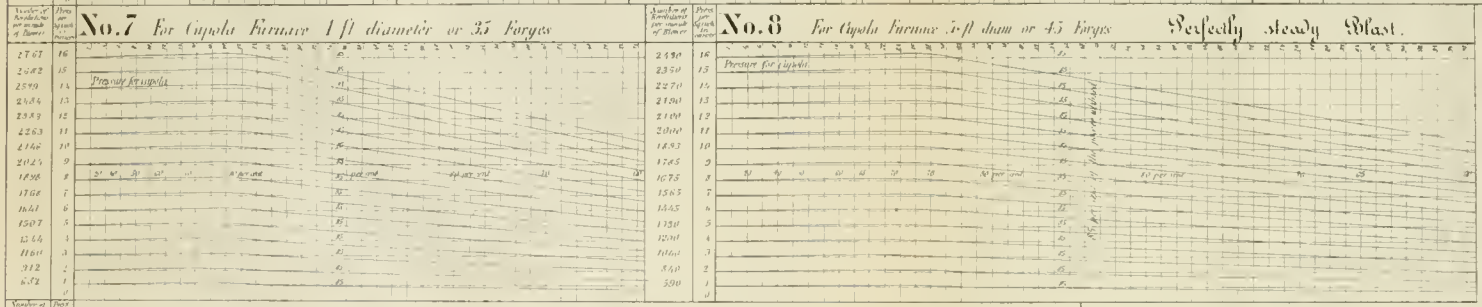


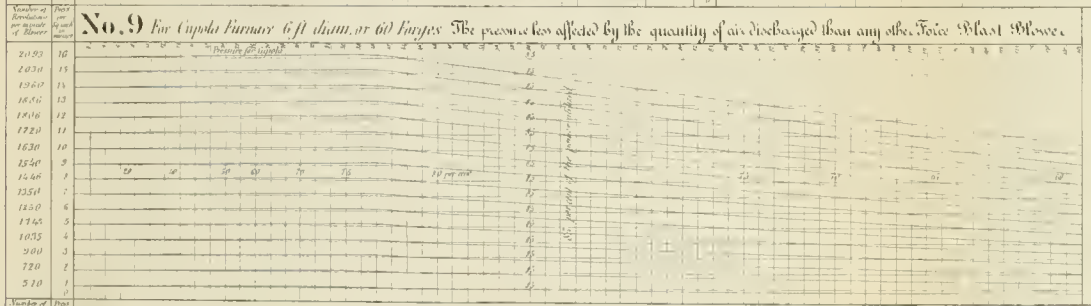
This engraving is designed to illustrate the fact, that the Sturtevant Pressure Blower will produce any given amount of blast, under pressures varying from 1 to 16 ounces, with less power than that required by the so-called, Rotary Force Blast Blowers. The curved lines are made from actual tests, taken by Mr. B.F. Sturtevant personally, at considerable expense of money and time, in fitting up Machinery for the purpose.

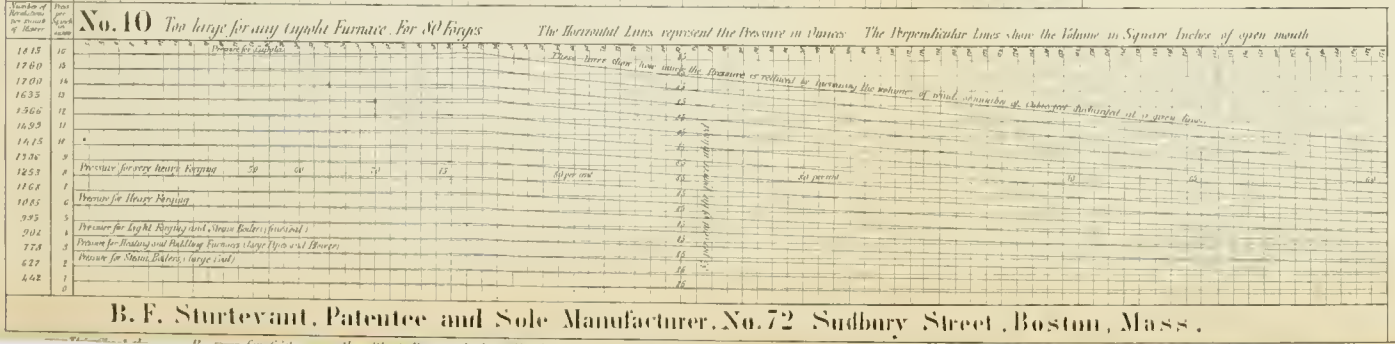
J. Mayer & Co. 11th & State St. Boston

Diagram showing the Pressure, Speed and Capacity of B. F. Sturtevant's Pressure Blower.









B. F. Sturtevant, Patentee and Sole Manufacturer, No. 72 Sudbury Street, Boston, Mass.

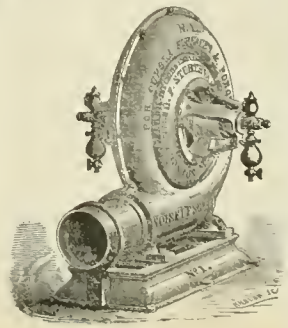
This Chart

Gives the speed of each size Blower from Nos. 1 to 10, for each ounce of blast from 1 oz. to 16 oz., making 160 different speeds. Used in connection with "Diagram showing excess of power required" it will give the power requisite to run any size Blower at any one of the ten speeds given. It shows the exact difference in size and capacity between different numbers of Blowers. It shows at what point in its capacity each Blower will "yield" or give the best percentage of blast;

85 per cent. being the best yet obtained.

The chief advantage which the *Sturtevant Blower* possesses over all others, is the high rate of speed at which it is capable of running, and the great quantity of air which it can discharge. There are no valves or slides, nor cam motions or gears in this Blower, to impede its velocity, coasume power, create noise, and wear out fast.

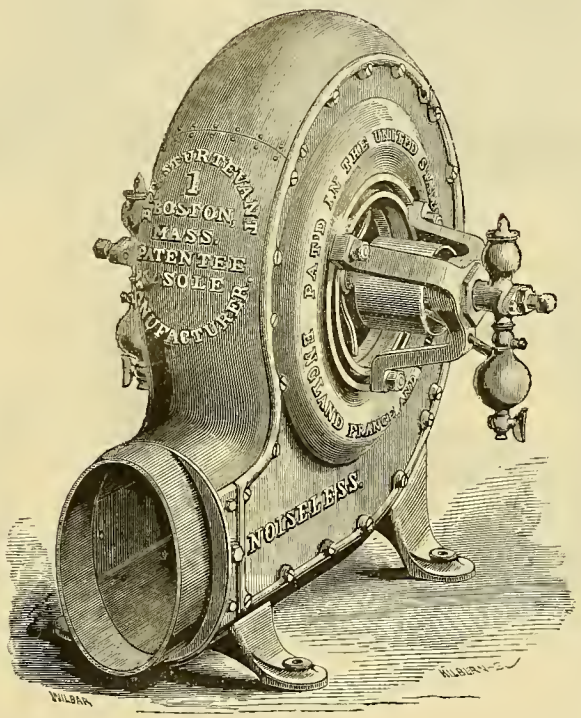
There are no Iron Foundries or Forge Establishments in this country which require a stronger blast under any circumstances than this Blower gives. There is no Blower made in the United States which will force the wind into a cupola furnace in such large quantities as the *Sturtevant Blower*. All other force blast Blowers are limited in the quantity of air which they discharge, for the reason that the air can only pass through them as fast as the Blower revolves, whereas in the *Sturtevant Blower* there is no impediment to the free passage of the air through the Blower. There exists nowhere in the *Sturtevant Blower* any of the objections to high speed which are usually met with in other machinery. The Patentee and Manufacturer of this Blower will guarantee the Blower in all cases to give entire satisfaction



Pressure Blower for Cupola Furnaces and Forges.

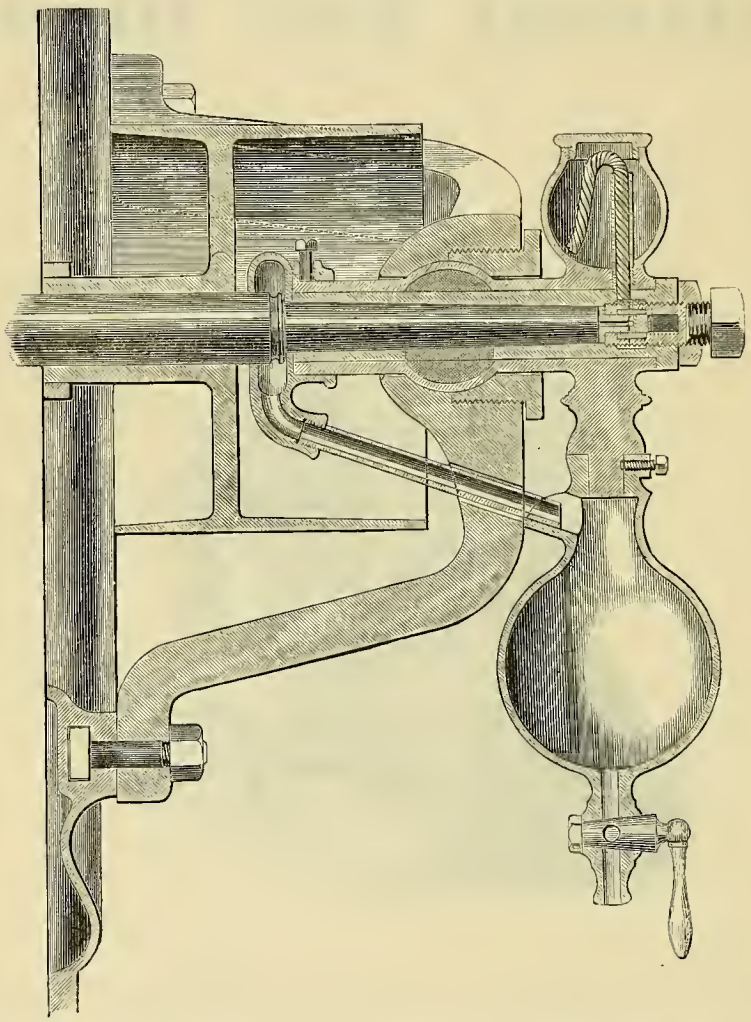
Pressure for Cupola Furnaces in the Blast Pipes which will always be unobservable, and in some cases require much Extra Speed of the Blower when the Pipes are small long and very crooked.

Sturtevant Fan Blower.

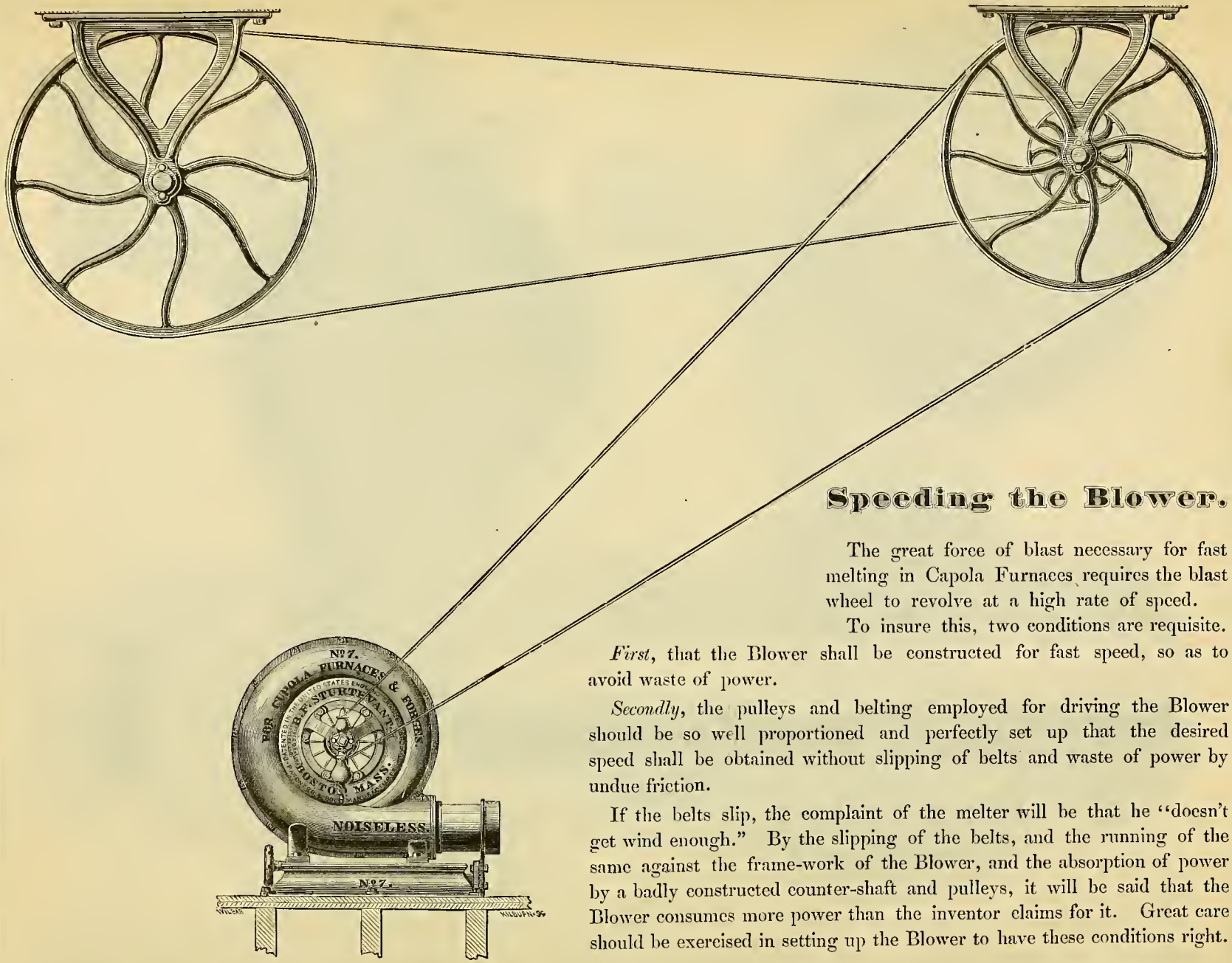


This cut represents the Sturtevant Improved Fan Blower, which is particularly adapted for Steam Boilers, Furnaces for puddling iron and melting steel, and Heating Furnaces for the manufacture of iron and steel Rails, merchant Iron and Steel, Axes and edge Tools, agricultural Implements, and other descriptions of Hardware; also, for large Furnaces and Forges used in connection with steam Hammers. Strength of blast usually about one-fourth pound per square inch.

Hanger, Pulley and Self-Oiling Journal.



This enlarged Section Cut shows the Hanger, Pulley and Self-Oiling Journal Bearing of my improved Fan and Pressure Blower. It will be seen that the Ball Joint is chambered, so as to receive and contain a mass of sponge or other porous material, for the purpose of absorbing a large quantity of oil, holding it in readiness and supplying it as may be wanted, to the Bearing, through three passages through the Bushing, which are also stuffed with the same material. The Bushings may be removed when worn, and new ones (which are sent with every Blower) substituted.



Speeding the Blower.

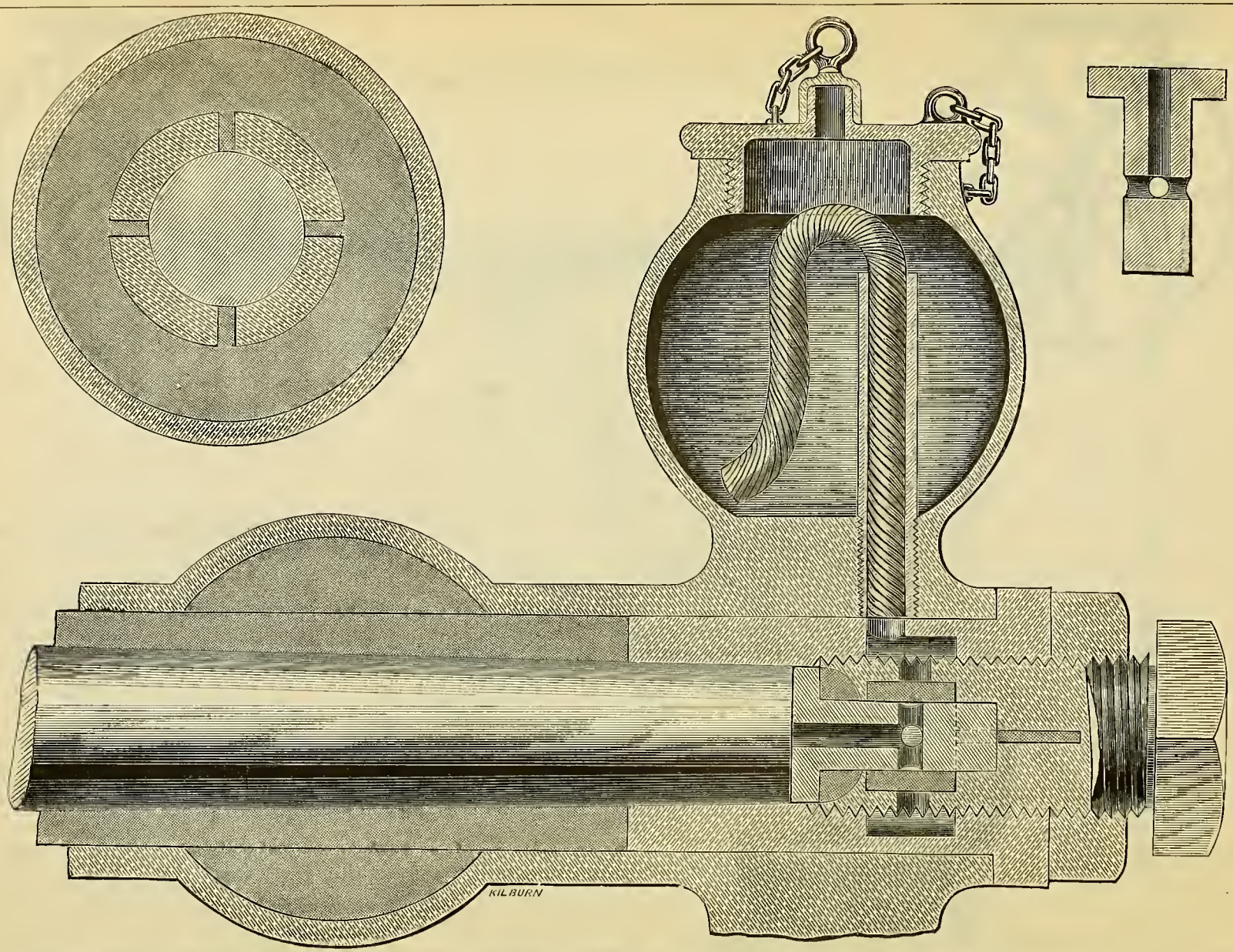
The great force of blast necessary for fast melting in Capola Furnaces requires the blast wheel to revolve at a high rate of speed.

To insure this, two conditions are requisite.

First, that the Blower shall be constructed for fast speed, so as to avoid waste of power.

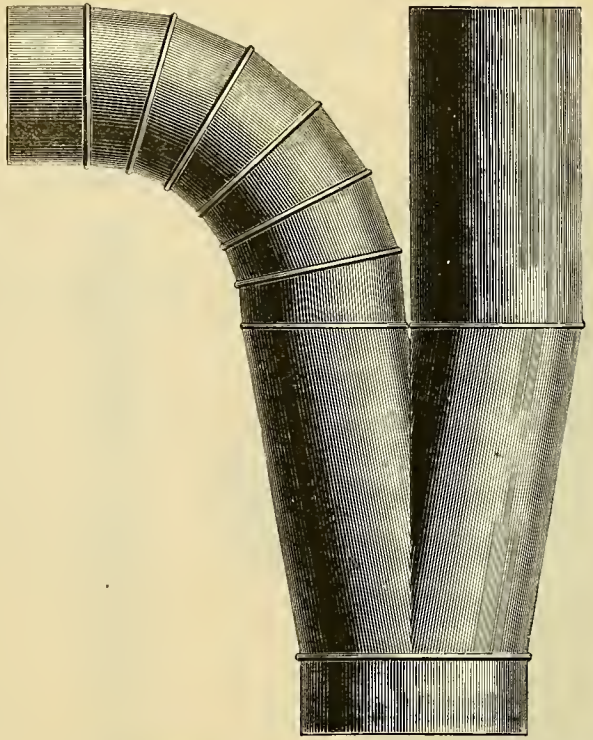
Secondly, the pulleys and belting employed for driving the Blower should be so well proportioned and perfectly set up that the desired speed shall be obtained without slipping of belts and waste of power by undue friction.

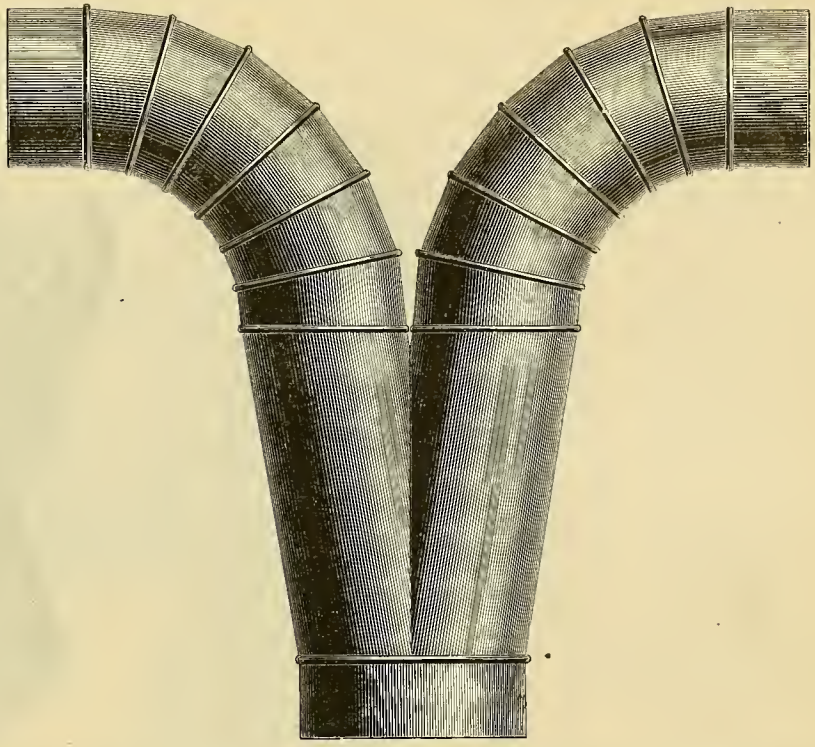
If the belts slip, the complaint of the melter will be that he "doesn't get wind enough." By the slipping of the belts, and the running of the same against the frame-work of the Blower, and the absorption of power by a badly constructed counter-shaft and pulleys, it will be said that the Blower consumes more power than the inventor claims for it. Great care should be exercised in setting up the Blower to have these conditions right.



This cut shows a portion of the Journal Bearing of Pressure Blowers and Exhaust Fans. This Bearing is held in place by two Cap Screws (see prospective cuts,) at the end, by means of which it can be easily removed and a spare one put in its place, should the Blower, after being many years in use, need new bearings or meet with accident. One pair of these Boxes or Bearings accompany each Blower or Exhaust Fan.

Branches and Elbows of Air Blast Pipes.

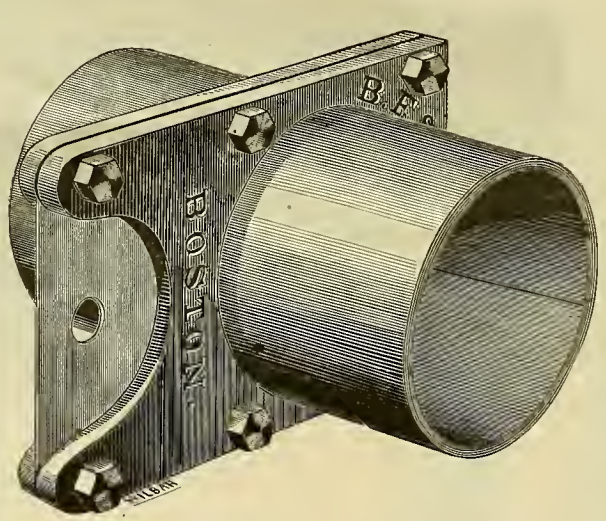




Right angles or square corners should never be used in pipes for conducting air, as they tend to largely diminish their capacity. When it is necessary to make turns in the pipe, easy curves should be introduced, as shown in the above cuts. When the blast or volume of air is to be divided, the branches should be constructed substantially as shown that it may flow with equal freedom into and through the several branches. The passage of air through pipes is always attended with much friction, and when the final discharge of air is a long distance from the blower the area of the pipe should be in proportion to its length and the area of discharge or tuyers, in all cases except where the pipe is used for carrying off shavings, saw-dust, etc., having the mouth of pipe wide open; in which case the current of air must necessarily be rapid enough to prevent heavy substances from lodging and filling up the pipe.

These remarks apply to Suction Pipes as well as Blast Pipes.

Blast Gate,



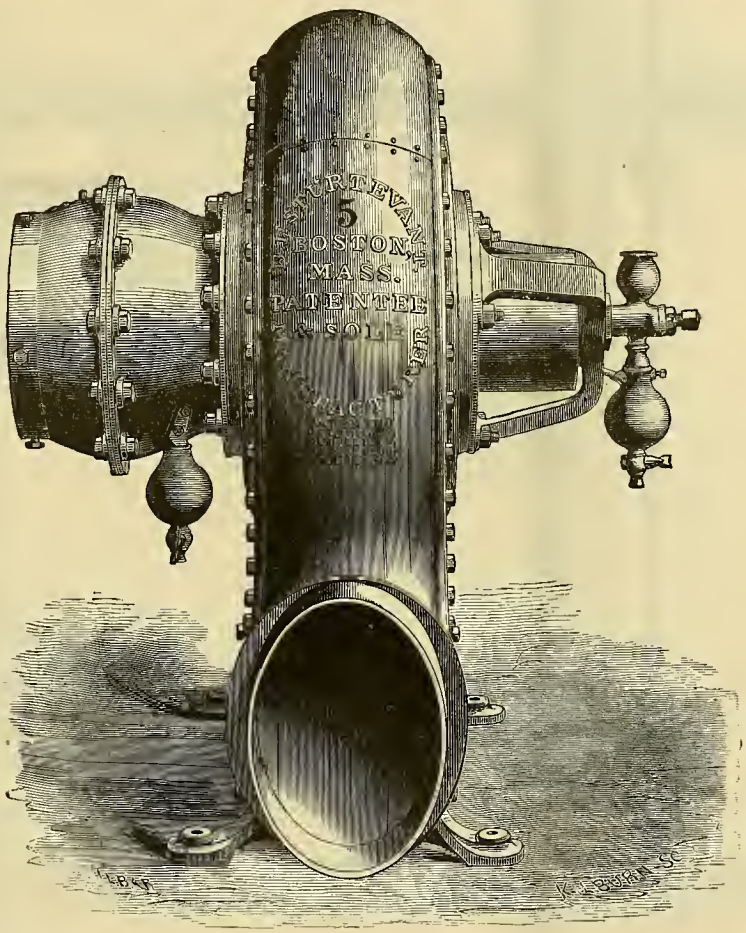
For opening and closing pipes which supply blast to Furnaces, Forges, &c.

PRICE LIST.

2 inch	$1 00	10 "	$8 00
3 "	1 65	12 "	10 25
4 "	2 40	15 "	15 00
5 "	3 25	16 "	16 00
6 "	4 25	20 "	18 00
8 "	6 00	24 "	25 00

B. F. Sturtevant's

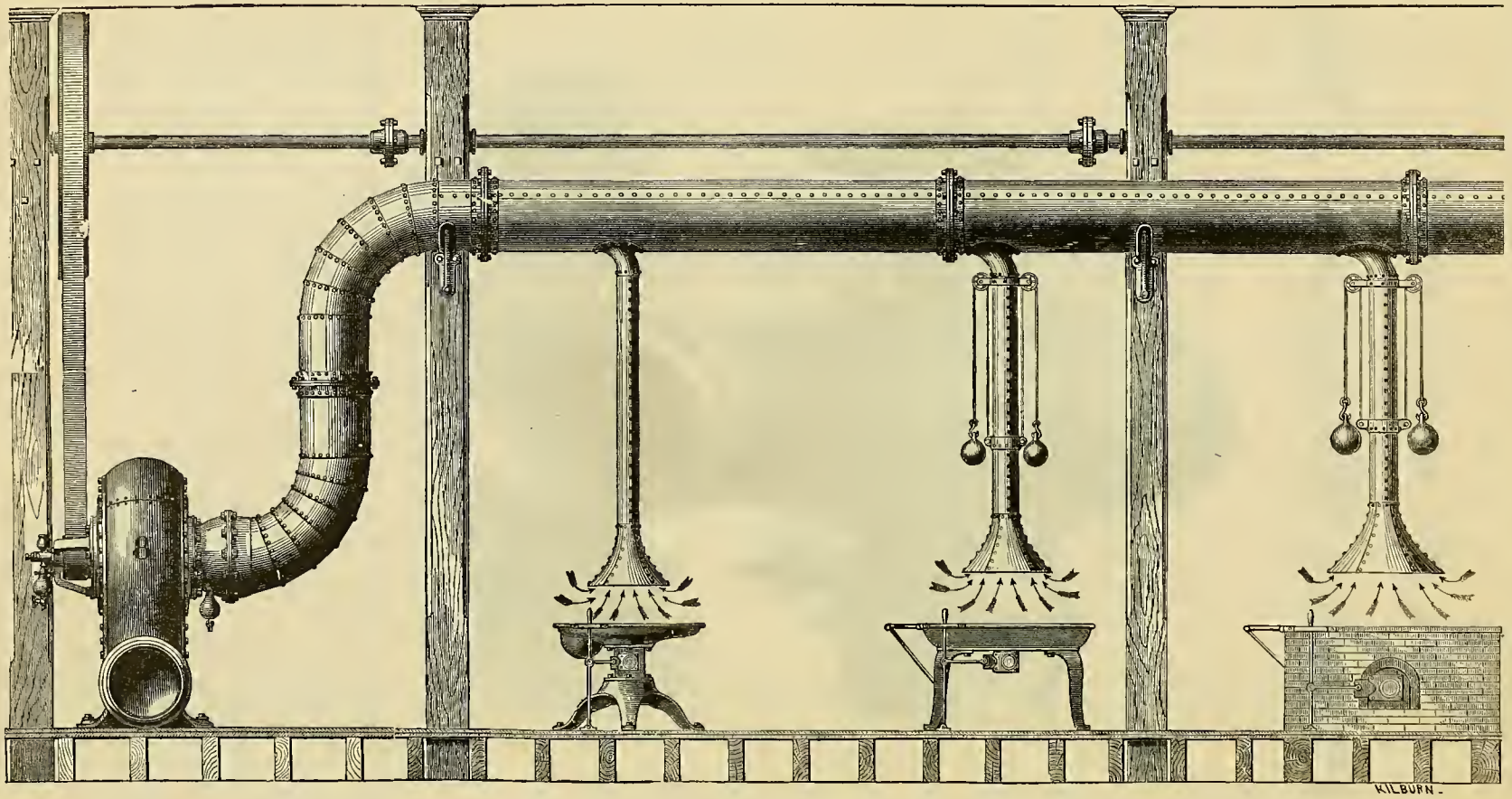
Patent Exhaust Fan.



For removing shavings from Planing and Moulding Machines, saw-dust, and dust from Sand Wheels such as are used for polishing lasts, carriage spokes, shoe bottoms, felt hats, &c., and Emery Wheels for polishing all kinds of hardware. Smoke and gas from smoky Smith Shops and Manufacturing Establishments and Chemical Works. Steam and vapor arising from Paper Machines, and all drying cylinders and dry-rooms, also sweat from Mill-Stones, offensive odors from Try Kettles and Dyeing Establishments. Dust from Rag and Cotton Pickers, Flax and Rope Machinery. Ventilation of Coal Mines and all Underground Apartments or Cellars.

B. F. Sturtevant's Patent Exhaust Fan

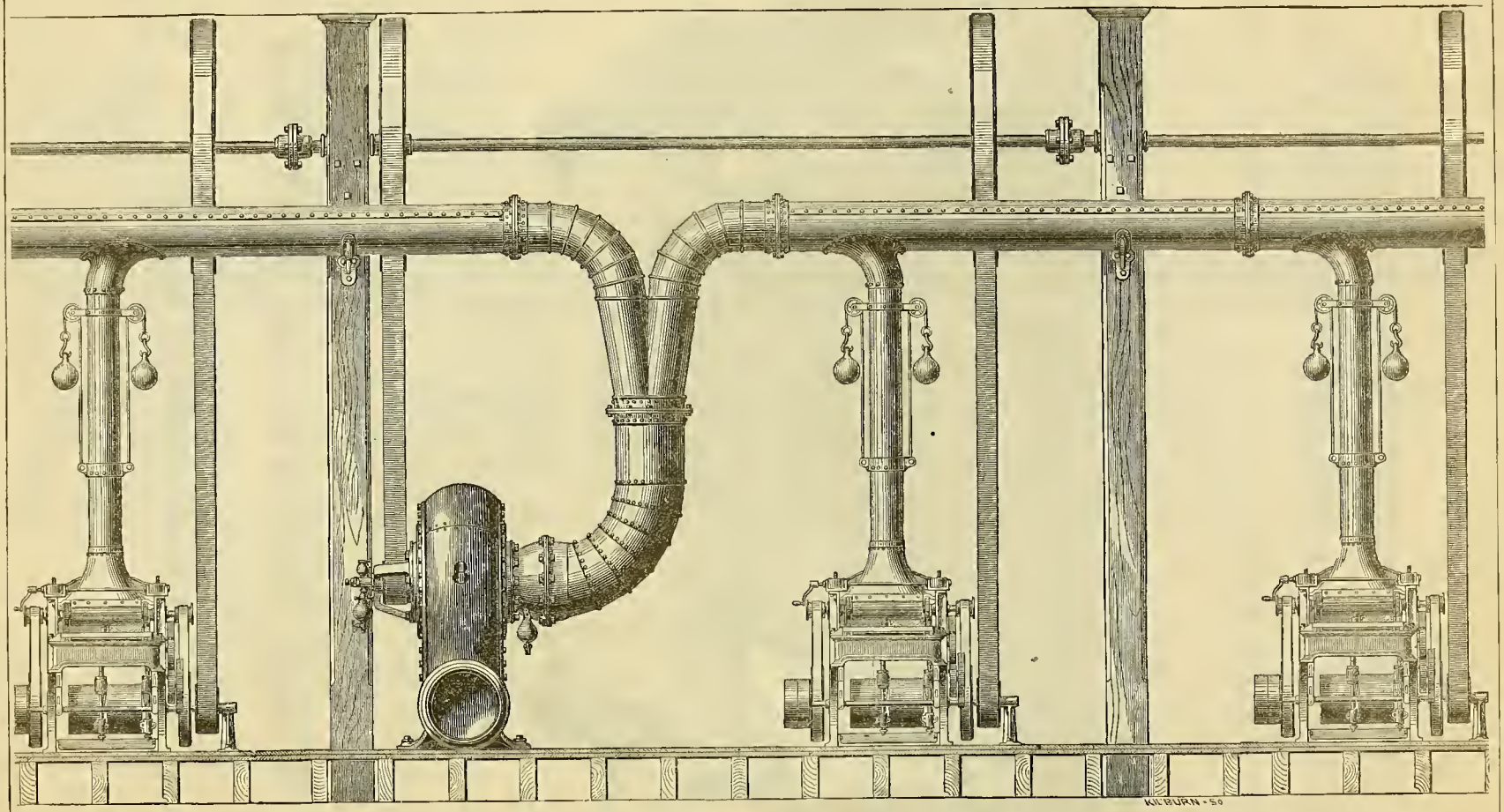
Adapted for removing Smoke and Gas from smoky Smiths' Shops and Manufacturing Establishments, Dirt from Cotton, Woolen and Rag Machinery, offensive odors from Try Kettles, &c., &c.



It will be seen in this engraving that the Fan is connected at one end of the Suction Pipe instead of the middle This is a good arrangement when the pipe is not too long. When the smoke and gas taken into the Suction Pipe is of a temperature above 300°, it will be necessary to use an Exhaust Fan especially adapted for hot blast, varying materially in its construction from the one shown in the above engraving.

B. F. Sturtevant's Patent

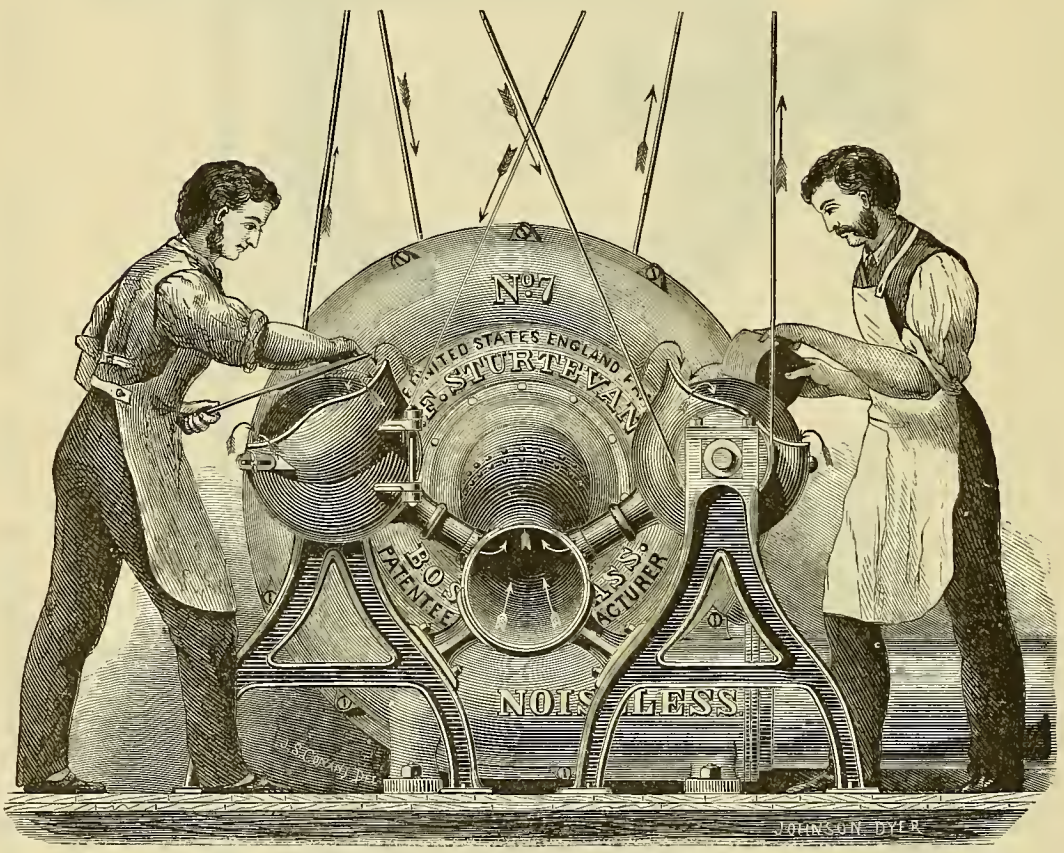
Exhaust Fan applied to Planing Machines.



The Fan may be placed on the floor as shown, or if of the smaller sizes up overhead, and at one end of the pipe. The pipes may be made round or square, in part or wholly of wood, instead of galvanized iron, as shown, and may be laid along or under the floor if desired. The branch pipes should enter the main, as shown, with an easy turn towards the Blower. Their combined area should in no case be greater than the area of the main pipe. The hoods should fit down as closely as possible around the point where the shavings are made.

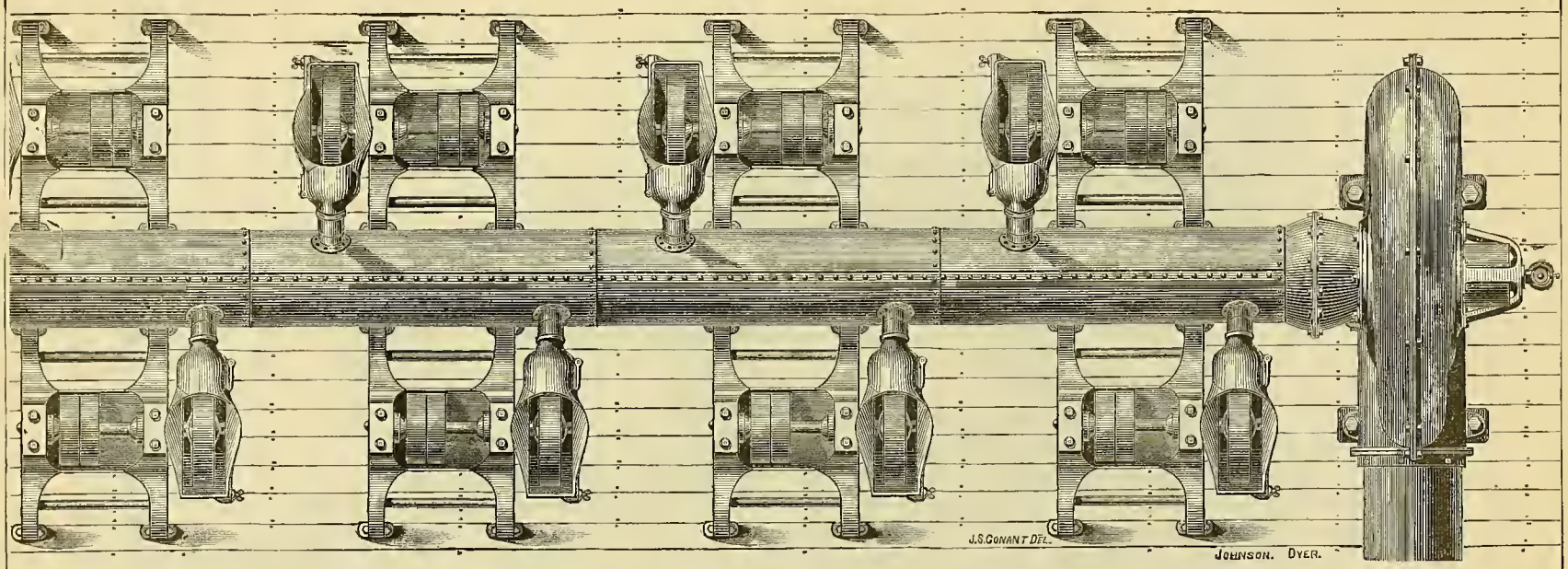
B. F. Sturtevant's

Patent Exhaust Fan.



Applied to Sand and Emery Wheels and Dry Grindstones, for grinding and polishing all kinds of Wooden and Hardware and Agricultural Implements.

Exhaust Fan applied to Emery Wheels.



Various modifications of this plan of arranging the Fan and pipes in connection with the wheels can be made, but in no case should the combined area of the branch pipes exceed the area of the suction and discharge pipes.

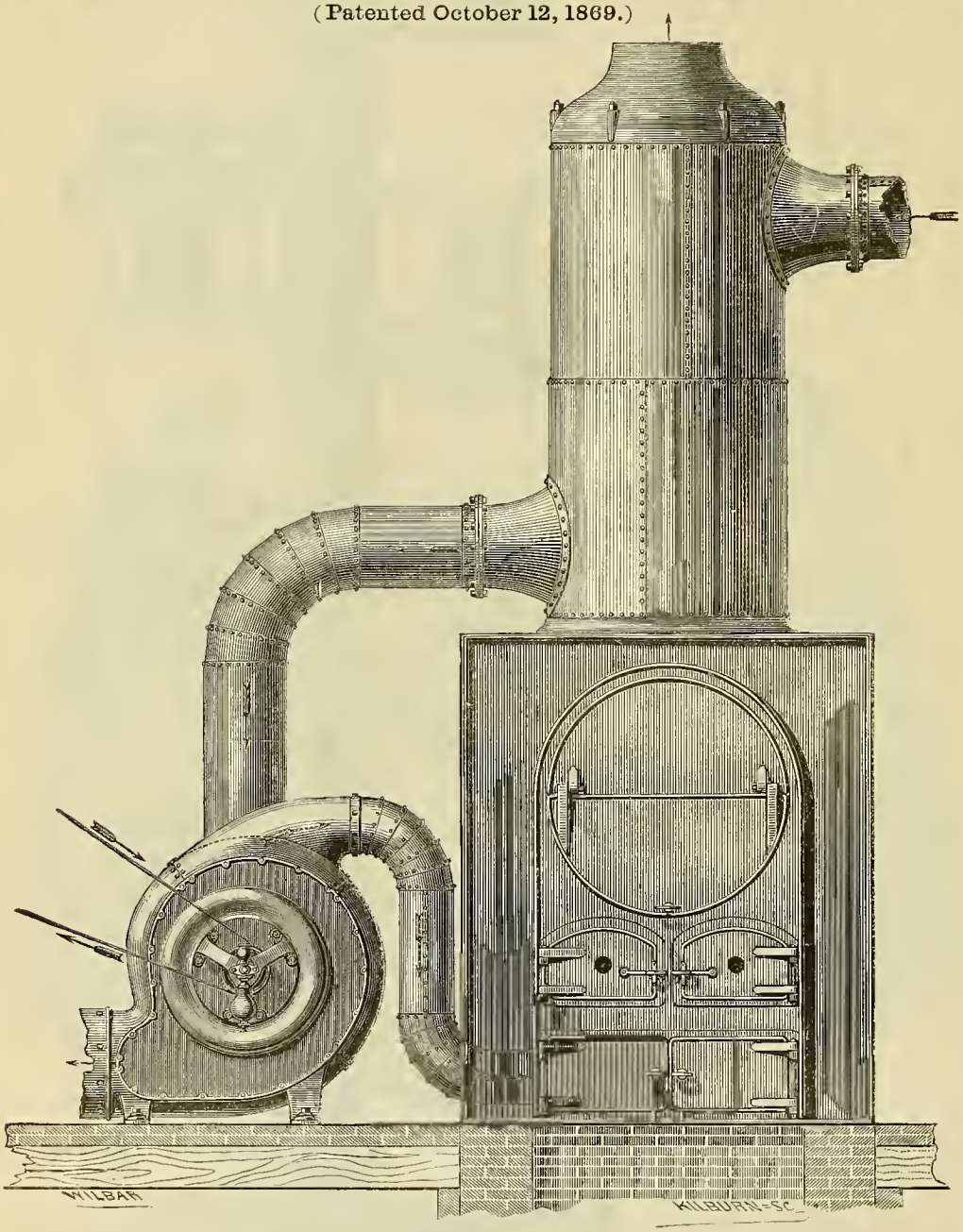
The Fan may be placed on the floor as shown, or if small it can be placed over head on a suitable scaffolding, or bolted directly to the ceiling. The discharge pipe may lead out of the building horizontally, or upward, or downward, but should in no case have elbows in it. The air discharged may be used to increase the draft under boiler furnaces, but should never be discharged into the chimney of the boiler.

When it is desirable that this work should be performed with the least possible noise, and at the same time create a very powerful draft, sufficient to draw in a large amount of dirt and other heavy substances, the Pressure Exhaust Fan should be used in preference to the regular Exhaust Fan which is used for removing shavings, etc.

B. F. Sturtevant's

Patent Air Blast Heater,

(Patented October 12, 1869.)

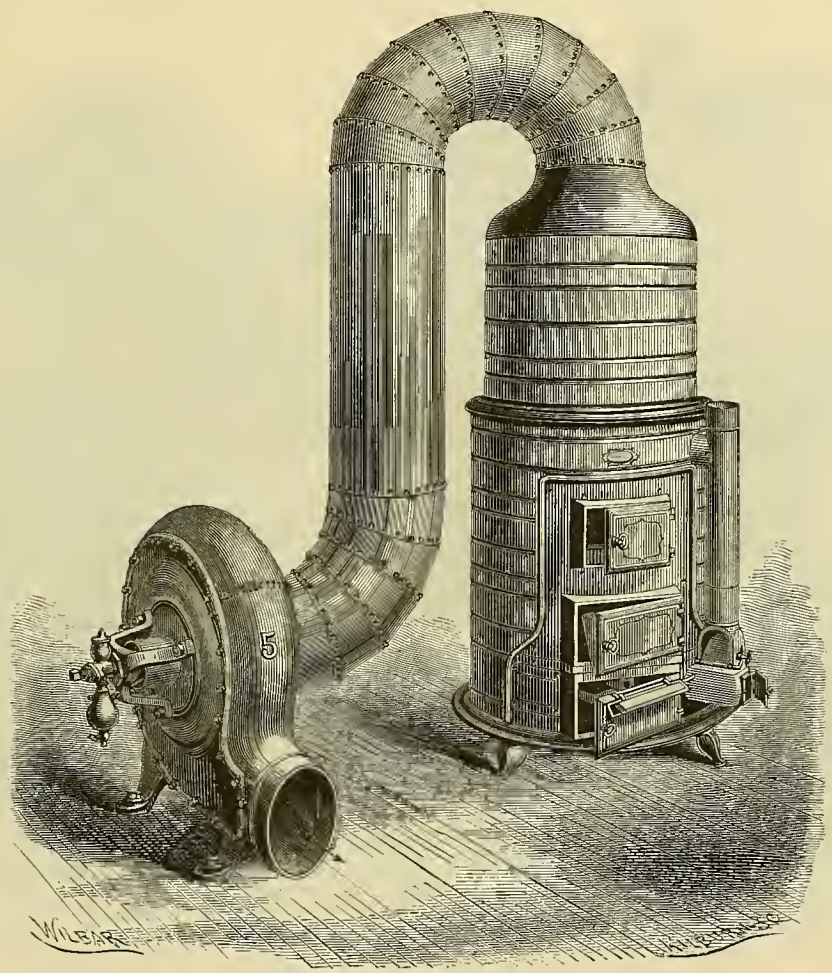


This cut represents the front of a Steam Boiler with an AIR BLAST HEATER mounted on the top, in position to receive the hot gases escaping into the chimney through a series of tubes for heating a current of air which is drawn through among the tubes by the Blower. A portion of the hot blast can be used for blowing the fire under the boiler, which is much better than cold air; while a very large surplus may be carried off for use in dry-houses and for heating large rooms in Manufacturing Establishments.

B. F. STURTEVANT'S

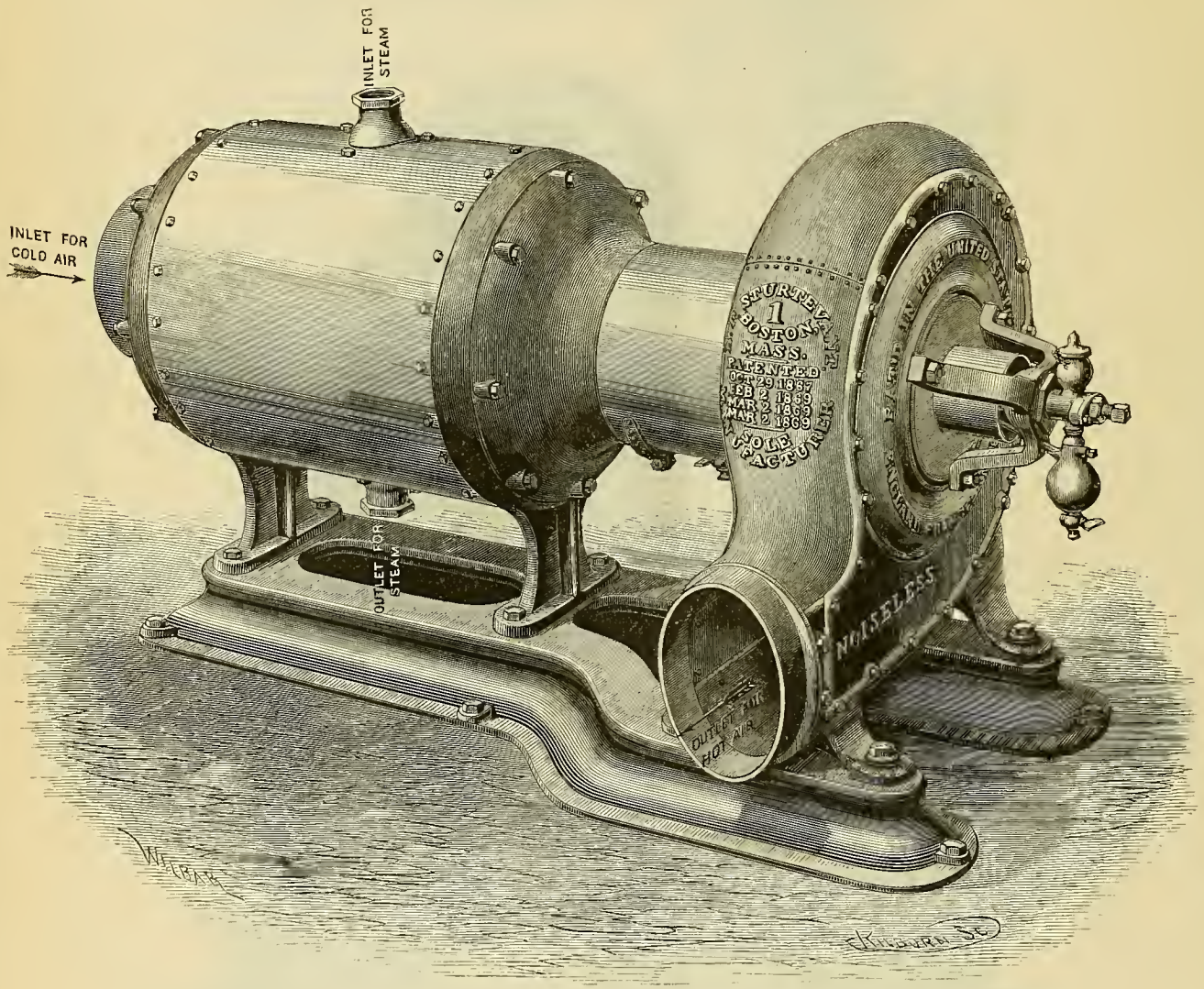
Patent Hot Blast Apparatus,

COMPOSED OF HOT AIR FURNACE AND BLOWER.



This apparatus may be used where there is water power for running the Blower, but no steam for heating; for drying all kinds of material and manufactures requiring it, such as cotton, wool, yarn, hosiery, leather, paper, leather board, tobacco, glue and chemicals. It is a first class apparatus for drying purposes, and is produced at low cost and is economical to run.

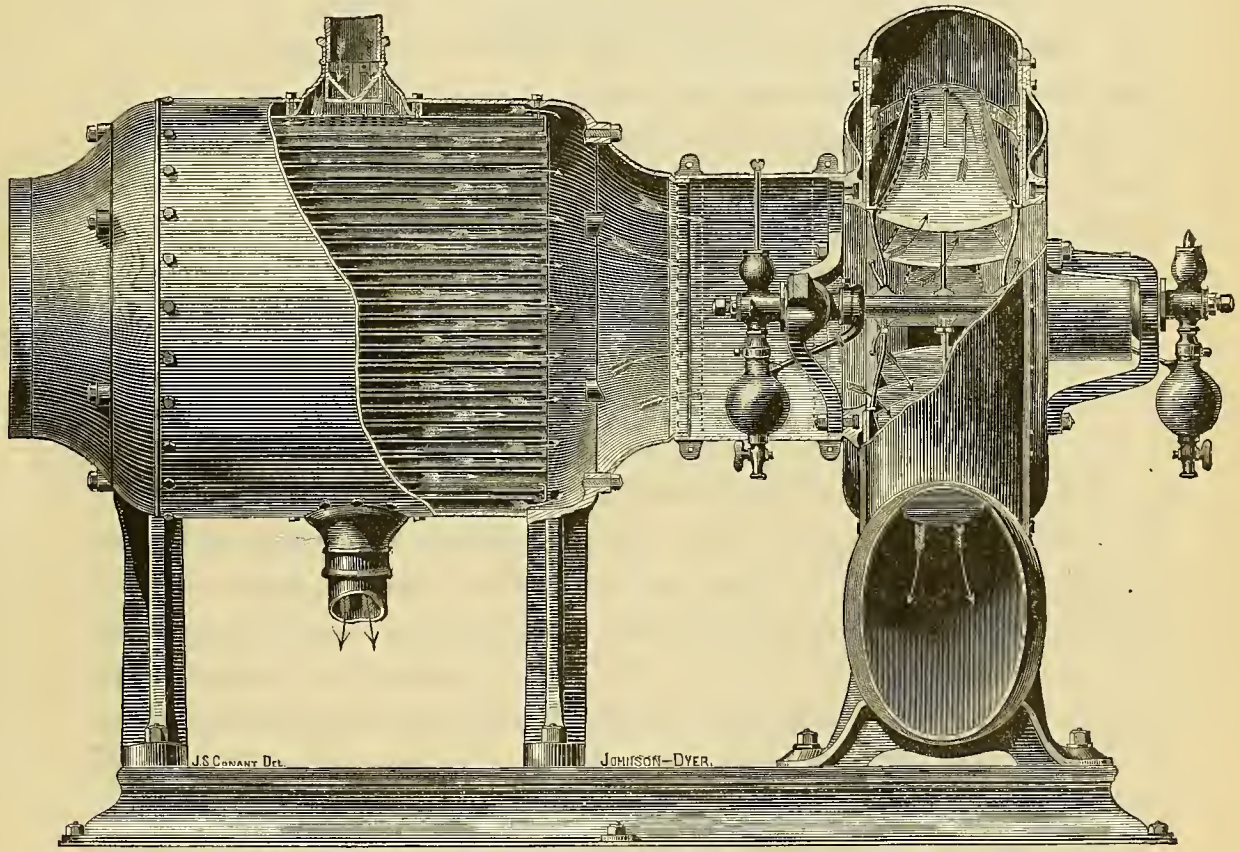
Exhaust-Steam Dryer.



For drying Lumber, Brick, Wool, Cotton and Hosiery,
Corn and other Grains; also, Leather,
Glue, Tobacco, &c.

B. F. Sturtevant's

Patent Hot Blast Apparatus.



Sectional View.

Adapted for Direct or Exhaust Steam

For Dry Houses, &c.

Exhaust-Steam Dryer.

This Dryer, composed of a Heater and Blower combined, requires no direct steam from the boiler; the exhaust pipe, being connected with the Heater, conducts the steam in among the air tubes, heating the air instantaneously to the temperature of 150° to 200° and makes no back pressure on the engine. The temperature can be regulated by the introduction of more or less steam into the Heater.

The Heater is constructed entirely of copper and brass, and is the most durable machine that has ever been offered to the public. The Blower used is my latest and most approved pattern. The hot blast can be carried several hundred feet, through pipes. Any change can be made in the blast-pipes without disturbing the Heater. Dryers of all sizes, capable of condensing the exhaust steam of an engine from one to one hundred horse-power.

Science of Drying.

The science of drying is in itself exceedingly simple, but to those who are entirely unacquainted with it, it appears mysterious, for the reason that the medium for carrying off the water being air, is not visible. Water and other substances which can be seen are much more readily understood. All the science there is about drying, is, that the air absorbs the moisture as a sponge absorbs water. In winter, when the out-door air is dry, as it usually is, (the frost condensing the moisture in the air,) it will, if heated up to say 150° take in or absorb moisture much more rapidly than in summer, when the out-door air has from 50 to 80 per cent. of its capacity for absorbing moisture already loaded; precisely the same as a sponge, when dry, absorbs water in larger quantities and more rapidly than when it is wet. Heated air will absorb moisture in proportion to the increase of temperature; its capacity for carrying large quantities of water being increased by the heat. A cubic foot of air at 32° will carry off only two grains of water, while at 160° it will carry off sixty grains,—hence the necessity of heating the air. Heated air for dry houses should have no moisture added to it other than that which it gathers from the substance being dried. No steam or vapor should be permitted to mingle with the air before it comes in contact with the contents

of the dry house. The air should be as dry as possible, and made to move rapidly, so as to wipe off the moisture from the surface of the lumber or other fibrous material as soon as it reaches the surface, as it works its way out from the centre of the body being dried.

All moist, green or wet substances requiring to be dried, should be treated in precisely the same manner, whether it be lumber, brick, wool, cotton, corn or other grain; the process for drying all these is exactly the same, viz: the rapid circulation of heated air, and the machinery necessary to accomplish this is nothing more nor less than a heater for heating the air and a blower for circulating it.

Re-Heating.

When the last stages of drying lumber is the object, I return the air through a return pipe into the Heater and re-heat it, for the purpose of avoiding unnecessary ventilation or escape of heated air, giving the air plenty of time to impart its heat to the lumber and absorb what little moisture there is, before passing out of the dry-house.

It may be supposed that the air, after having once passed through a pile of green lumber, or bed of wool or cotton which is wet, will have become thoroughly saturated with moisture, rendering it incapable for further use in drying. It has, however, been found by actual experiment that heated air will pass through the material to be dried from fifty to one hundred times before becoming thoroughly moistened: — a dry sponge used for wiping off perspiration is a good illustration of the manner in which the air wipes off and absorbs the moisture from the substance being dried.

It may be thought by some that my process of heating will heat the air too hot, but this is not possible, except in cases where glue or chemicals are to be dried which will melt at a comparatively low temperature. Air heated by a furnace is liable to be heated up to 500°, and direct steam pipes, when the steam is circulating rapidly under high pressure, will heat from 250° to 300° when the air is confined; but my apparatus is not liable under any circumstances to heat the air over 200°. This temperature will not injure or discolor anything, either grain, lumber or other fibrous substances.

I have heard of several instances where blowers have been connected with dry-houses for drying lumber, grain, &c., which did not work satisfactorily, and after investigating the subject thoroughly, I have invariably found that the difficulty was a superabundance of ventilation, or, in other words, the air was driven with such rapidity that it did not have time to heat, neither did it have time to give off its heat, nor did the air have sufficient time to become saturated with moisture.

Objections.

As a lumber dryer, parties not having tried it have raised the following objections :— First—that it lays still and inoperative fourteen hours out of twenty-four. Second—that too much circulation of the air cracks the lumber. Third—that it will not furnish sufficient heat to the dry-house.

These objections are somewhat contradictory. Nothing but rapid drying will cause lumber to check; the outside of the lumber shrinking much faster than the inside is what produces the checking or warping of the lumber. There is no greater proof of the superiority of a dryer, than that it dries the lumber so fast that it cracks.

No green lumber will stand a temperature of 200° when there is a proper circulation of dry air. When the temperature is up to 200° it is necessary to have the lumber surrounded with dead, moist air, to keep it from cracking. A dry-house heated up to 125° good circulation for ten hours, will, when the engine stops, be full of dry hot air; the lumber will then have time to even its drying, the outer surface drawing the moisture from the centre.

Another objection raised, is, that the kind of heat is not the best. Now there are no two kinds of heat. Some people speak of moist heat, that occurs where the heated air has been moistened by the addition of vapor. The only difference between moist and dry heat is in the moisture of the air, and not of the heat. Heat is nothing but heat. The air may be moist or dry before it is heated, or may be moistened afterwards. Air cannot be dried except by being brought in contact with something very cold, when its moisture will be condensed and settle in the form of dew. There is no process known by which moisture can be extracted from the air while it is hot. Heated air will take in more and more moisture until it becomes thoroughly saturated.

When exhaust-steam is used for heating feed water, it is only when the pump is worked that any of the steam is condensed by the cold water, and even then but a small part. Steam, after passing through the feed-water heater, can be conducted into the air heater and produce the very best results.

This apparatus, which I now offer to the public, accomplishes the work of drying in a far more economical and expeditious manner than anything heretofore in use with which I am acquainted.

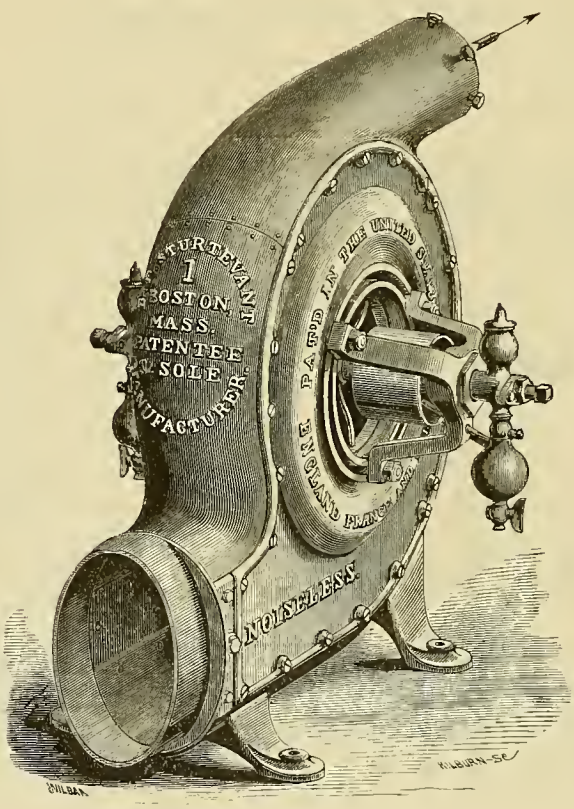
Heaters for public buildings and factories constructed on the same principle.

Hot Blast Apparatus.

PRICE LIST, &c.

Number.	*Diameter of Exhaust Pipe in Inches.*	*Diameter of Blast Pipe.*	*Diameter of Pulley on Blower.*	*Revolutions of Blast Wheel for Fair Blast.*	*Cubic Feet of Air Discharged Per Minute.*	*Price.*
2	1½	6	3	2800	1400	***$150 00***
3	1½	7½	4	2400	1740	***200 00***
4	2¼	9	6½	1900	2080	***300 00***
5	2½	10½	7½	1600	3000	***400 00***
6	3½	13½	8¾	1300	4800	***500 00***
7	4	15	10	1100	6880	***650 00***
8	4	18½	11	1000	9100	***800 00***
9	5	20	12	800	12180	***1000 00***
10	6	23½	14	700	17400	***1200 00***
11	7	25½	16	600	26000	***1500 00***
12	8	28	18	500	37700	***1800 00***

Double Mouth Fan Blower.

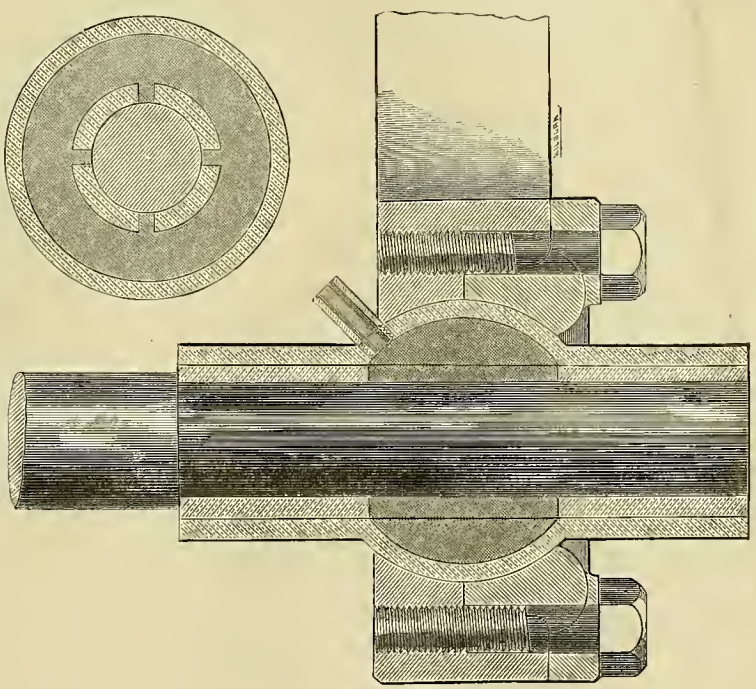


This cut represents a Fan Blower with two mouths or outlets, one larger than the other, and is well adapted for use in establishments where steam boilers and forges are to be furnished with blast from the same blower, the large outlet supplying the boiler and the small one the forges.

SECTION OF

Journal Bearing

For Counter Shaft.



The above cut shows the Self-Oiling Box, and Universal Joint by which it is attached to the Hanger. It will be seen that the Ball Joint is chambered, so as to receive and contain a mass of sponge or other porous material, for the purpose of absorbing a large quantity of oil, holding it in readiness and supplying it as may be wanted to the Bearing, through three passages through the Bushing, which are also stuffed with the same material.